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10/562,620	05/26/2006	Robert John Kopmeiners	Kopmeiners 8-3-4	6172

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,620	KOPMEINERS ET AL.	
	Examiner	Art Unit	
	CANDAL ELPENORD	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7-19 and 22-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 7-19, 22-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 30, 2009 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 26-29** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 26, 29, the phrase "can be" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claims 27-28 are rejected by virtue of their dependency on claim 26.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. **Claims 1-11, 13-15, 16-25,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Perahia et al (US 7,352,688 B1) in view of Li et al (US 2004/0258025 A1) and further view of Li #2 et al (US 2003/0016621 A1).

Regarding claims 1,16, Perahia '688 discloses a method for transmitting data ("method for transmitting OFDM signal", col. 2, lines 15-25, lines 41-50) in a multiple antenna communication system (fig. 1, Wireless Communication System comprising of antenna elements, col. 4, lines 1-21, fig. 3, MIMO transmitter system 300, col. 5, lines 6-9) and a transmitter circuit (fig. 3, see IFFT block 308/processor, col. 5, lines 24-27), having N transmit antennas (noted: transmitting a signal via a first OFDM antenna element, and via a second antenna element, col. 2, lines 41-50, see fig. 3, OFDM antenna elements 106H and 106V, col. 4, lines 11-21), said method comprising the step of: transmitting a legacy preamble (noted: transmitting of preamble containing long training symbols according to IEEE 802.11, col. 5, lines 28-36) and at least one additional long training symbol (fig. 5 to fig. 6, 2nd Long Training Symbol 506, col. 6, lines 29-45) on each of said N transmit antennas (noted: transmitting a signal via a first OFDM antenna element, and via a second antenna element, col. 2, lines 41-50, see fig. 3, OFDM antenna elements 106H and 106V, col. 4, lines 11-21), wherein a sequence of each of said long training symbols (fig. 5 to fig. 6, 1st and 2nd Long Training Symbols 506, col. 6, lines 29-45, fig. 6, see Odd and Even Long Training Symbols 604, 606) on each of said N transmit antennas are orthogonal (noted: transmission of the long training symbols by two transmitting antenna elements using non-overlapping subsets of subcarriers, col. 8, lines 48-60).

Regarding claims 2, 17, Perahia '688 discloses the method, wherein said legacy preamble further comprises at least one short training symbol (fig. 1 to fig. 2, see Short Training Symbols 502 of the preamble, col. 6, lines 33-37).

Regarding claims 3,18, Perahia '688 discloses the method, wherein said legacy preamble further comprises at least one SIGNAL field (noted: fig. 5 to fig. 6, SGNAL field 512 that designate modulation type, col. 6, lines 53-57).

Regarding claims 4, 19, Perahia '688 discloses the method, wherein said legacy preamble is an 802.11a/g preamble (noted: IEEE 802.11a standard or use of preamble, col. 5, lines 28-36, col. 6, lines 48-53).

Regarding claims 8, 23, Perahia '688 discloses the method ("method for transmitting OFDM signal", col. 2, lines 15-25, lines 41-50), wherein N is two (and wherein said transmitting step further comprises the step of transmitting a legacy preamble having at least one long training symbol and one additional long training symbol (fig. 5 to fig. 6, see 1st and 2nd Long Training Symbols 506) on each of said two transmit antennas (fig. 5, Antenna Element 1 and Antenna Element 2, col. 6, lines 29-32) wherein one of said transmit antennas transmits one (noted: transmitting of first OFDM training signal/symbol on first antenna, col. 2, lines 41-50) of said long training symbols (fig. 5 to fig. 6, see 1st and 2nd Long Training Symbols 506) with a reversed polarity (noted: generation of antenna polarizations, fig. 3, col. 5, lines 6-15).

Regarding claims 9, 24, Perahia '688 discloses the method, whereby a lower order receiver (fig. 4, Receiver, processing the received long training symbol, col. 9, lines 54-67) can interpret said transmitted data (fig. 4, Receiver, processing the received long training symbol, col. 9, lines 54-67, col. 5, lines 45 to col. 6, lines 21).

Regarding claims 10, 25 Perahia '688 discloses the method, further comprising the step of transmitting a field (fig. 5 to fig. 6, see, Element 1, 2 identifying the distinct antennas 1,2) indicating said number N of transmit antennas (Noted: transmitted long training symbols by antenna elements 1, 2, col. 6, lines 29-32, col. 8, lines 48-60).

Regarding claim 11, Perahia '688 discloses the method, further comprising the step of transmitting a field identifying an employed coding scheme (noted: the signal filed 512 indicating the modulation type , col. 6, lines 53-57, QAM modulation, col. 5, lines 16-27).

Regarding claim 13, Perahia '688 discloses the method, further comprising the step of transmitting a field identifying a long training symbol format (fig. 6, see Odd and Even transmitted Long Training Symbol 604, 606, col. 8, lines 48-60).

Regarding claim 14, Perahia '688 discloses the method, wherein said legacy preamble has a shorter guard interval (fig. 5 to fig. 6, see Guard Interval 508, col. 6, lines 38-54).

Regarding claim 15, Perahia '688 discloses the method, wherein said legacy preamble (Noted: preamble with long training symbols, col. 5, lines 28-36) has a long training field containing only one long training symbol (fig. 5 to fig. 6, see long training symbol field 506, 604, 606).

Perahia '688 discloses all the claimed limitations as set forth above with the exception of being silent with respect to claimed features: **Regarding claim 1**, **16**, wherein the legacy preamble comprises at least one long training symbol.

However, Li '025 from the same field of endeavor discloses the above claimed features:

Regarding claims 1, **16**, wherein the legacy preamble comprises at least one long training symbol (fig. 6, see 802.11 compatible preamble with long training symbol block 1, long training symbol block 2 along with signals field and the OFMD data field, paragraphs 0025-0027).

In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Perahia '688 by using the teaching features of Li '025 in order to provide enhancement of data rate of wireless LAN in a MIMO system as suggested in paragraph 011 for motivation.

The combination of Perahia '688 in view of Li '025 discloses all the claimed limitations with the exception of claimed features:

Regarding claim 1, 16, wherein each of the long training symbols are time orthogonal by introducing a phase shift between at least two of said training symbols transmitted on one of the N transmit antennas.

Regarding claims 7, wherein said phase shift is introduced to each of said long training symbols using a complex rotation.

Regarding claim 22, the transmitter, wherein each of said time orthogonal long training symbols are stored in memory and the phase shift is introduced when the long training symbols are transmitted.

However, Li #2 '621 from the same field of endeavor discloses the above claimed features:

Regarding claim 1, 16, wherein each of the long training symbols are time orthogonal by introducing a phase shift between at least two of said training symbols (see, phase shift of the first and second training symbols, claims 5-7) transmitted on one of the N transmit antennas (fig. 1, OFDM transmit antennas 130-1, 130-2 to 130-N, paragraph 0021, 0023).

Regarding claim 7, wherein said phase shift is introduced to each of said long training symbols (see, phase shift of the first and second training symbols, claims 5-7) using a complex rotation (see, phase shift of the first and second training symbols, claims 5-7-A phase shift encompasses a complex rotation).

Regarding claim 22, the transmitter, wherein each of said time orthogonal long training symbols are stored in memory (fig. 5, see memory 520 for storing set of training symbols, paragraph 0048, lines 1-7) and the phase shift is introduced when the long training symbols are transmitted (see, phase shift of the first and second training symbols, claims 5-7).

In view of the above, having the combined teaching features of Perahia '688 in view of Li '025, and the telecommunication system for transmitting training symbols using phase rotation between the training sequences of Hook '506, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teaching features of Perahia '688 in view of Li '025 by using the phase rotation technique between training symbols as taught by Hook '506 in order to provide recovery of the transmitted training symbols at the receiver as suggested in col. 3, lines 23-38.

8. **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Perahia et al (US 7,352,688 B1) in view Li et al (US 2004/0258025 A1), Li #2 et al (US 2003/0016621 A1) as applied to claim 1 and further view of Gardner et al (US 2005/0233709 A1).

Regarding claim 12, Perahia '688 , Li '025 and Li #2 '621disclose all the claimed limitation with the exception of being silent with respect to claimed features: the method, further comprising the step of transmitting a field identifying channel bonding options

However, Gardner '709 from the same field of endeavor discloses the above claimed features: the method (noted: method for providing coexistence between the extended devices and the legacy IEEE 802.11a and IEEE 802.11g, paragraph 0062), further comprising the step of transmitting a field identifying channel bonding options

(noted: transmission of signal using combination of extensions, paragraphs 0026-0034, 0048-0049).

In view of the above, having the method for transmitting signal/training preamble of Perahia '688, the MIMO communication system of Li '025, the teaching features of LI '621and the teaching features of Gardner '709, it would have been obvious to one or ordinary skill in the art at the time the invention was made to modify the features of Perahia '688 with Li '025, Li #2 '621 by using features as taught by Gardner '709 in order to provide compatibility using legacy devices as suggested in paragraphs 0009-0010 for motivation.

9. **Claims 26-29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Perahia et al (US 7,352,688 B1) in view of Gardner et al (US 2005/0233709 A1) and further view of Li et al (US 2004/0258025 A1), Li #2 et al (US 2003/0016621 A1).

Regarding claims 26, 29, Perahia '688 discloses a method for receiving data on at least one receive antenna (Noted: "method for receiving a signal via a first antenna element", col. 2, lines 59-63, fig. 4, see, Receiver in Operation, col. 5, lines 45 to col. 6, lines 21col. 9, lines 54-67) transmitted by a transmitter having N transmit antennas (noted: transmitting a signal via a first OFDM antenna element, and via a second antenna element, col. 2, lines 41-50, see fig. 3, OFDM antenna elements 106H and 106V, col. 4, lines 11-21) in a multiple antenna communication system (fig. 1, Wireless Communication System comprising of two antenna elements, col. 4, lines 1-21, fig. 3, MIMO transmitter system 300, col. 5, lines 6-9), said method (Noted: "method

for receiving a signal via a first antenna element", col. 2, lines 59-63, fig. 4, see, Receiver in operation, col. 5, lines 45 to col. 6, lines 21, col. 9, lines 54-67) comprising the steps of: receiver circuit (fig. 4, see receiver processor)/ receiving a legacy preamble having at least one long training symbol (noted: the receiver, receiving a first long training symbol, col. 6, lines 7-21), and at least one additional long training symbol on each of said N transmit antennas (noted: transmitting a signal via a first OFDM antenna element, and via a second antenna element, col. 2, lines 41-50, see fig. 3, OFDM antenna elements 106H and 106V, col. 4, lines 11-21), wherein a sequence of each of said long training symbols (fig. 5 to fig. 6, see 1st and 2nd Long Training Symbols 506) on each of said N transmit antennas (noted: transmitting a signal via a first OFDM antenna element, and via a second antenna element, col. 2, lines 41-50, see fig. 3, OFDM antenna elements 106H and 106V, col. 4, lines 11-21) are orthogonal (noted: transmission of the long training symbols by two transmitting antenna elements using non-overlapping subsets of subcarriers, col. 8, lines 48-60, receiving the OFDM signal using non-overlapping first and second set of subcarriers, col. 2, lines 51-63).

Regarding claim 27, Perahia '688 discloses the method (Noted: "method for receiving a signal via a first antenna element", col. 2, lines 59-63, fig. 4, see, Receiver in Operation, col. 5, lines 45 to col. 6, lines 21col. 9, lines 54-67), wherein said method is performed by a SISO receiver (fig. 4, SISO receiver, col. 9, lines 54-67).

Perahia '688 discloses all then claimed limitation with the exception of being silent with respect to claimed features:

Regarding claims 26, 29, and an indication of a duration of a transmission of said data; said legacy preamble transmitted such that said indication of a duration can be interpreted by a lower order receiver; and deferring for said indicated duration.

Regarding claim 28, wherein said indication is transmitted in a SIGNAL field that complies with the 802.11 a/g standards.

However, Gardner '709 from the same field of endeavor discloses the above claimed features:

Regarding claims 26, 29, and an indication of a duration of a transmission of said data (noted: legacy receiver defers of incoming packet signals for a time", paragraph 0025, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, 0059); said legacy preamble transmitted such that said indication of a duration can be interpreted by a lower order receiver (fig. 3, Receiving Antenna, paragraph 0022, noted: receiver detecting the received long training symbols, paragraph 0034, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, fig. 1, fig. 4, and fig. 8); and deferring for said indicated duration (noted: "legacy receiver defers processing of incoming packet signals for a time", paragraph 0025).

Regarding claim 28, wherein said indication is transmitted in a SIGNAL field (Noted: signal field with a four microseconds duration, paragraph 0005, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055) that complies with the 802.11 a/g standards (noted: legacy

wireless device that is compatible with IEEE 802.11a and 802.11g, paragraphs 0027-0028).

In view of the above, having the method for transmitting signal/training preamble of Perahia '688, and the teaching features of Gardner '709, it would have been obvious to one or ordinary skill in the art at the time the invention was made to modify the features of Perahia '688 by using features as taught by Gardner '709 in order to provide compatibility using legacy devices as suggested in paragraphs 0009-0010 for motivation.

The combination of Perahia '688 and Gardner '709 discloses all the claimed as set forth in the above rejection with the exception of being silent with respect to claimed features: **Regarding claims 26, 29**, wherein the legacy preamble comprises at least one long training symbol.

However, Li '025 from the same field of endeavor discloses the above claimed features:

Regarding claims 26, 29, wherein the legacy preamble comprises at least one long training symbol (fig. 6, see 802.11 compatible preamble with long training symbol block 1, long training symbol block 2 along with signals field and the OFMD data field, paragraphs 0025-0027).

In view of the above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Perahia '688 with Gardner '709 by using the teaching features of Li '025 in order to provide enhancement

of data rate of wireless LAN in a MIMO system as suggested in paragraph 011 for motivation.

The combination of Perahia '688, Gardner '709 and Li '025 discloses all the claimed limitations as set forth in the above rejection with the exception of claimed features:

Regarding claims 26, 29, wherein each of said long training symbols are time orthogonal due to a phase shift that was introduces between at least two of said training symbols on one of the N transmit antennas.

However, Li # 2 '621 from the same field of endeavor discloses the above claimed features:

Regarding claims 26, 29, wherein each of said long training symbols are time orthogonal due to a phase shift that was introduces between at least two of said training symbols (see, phase shift of the first and second training symbols, claims 5-7) on one of the N transmit antennas (fig. 1, OFDM transmit antennas 130-1, 130-2 to 130-N, paragraph 0021, 0023).

In view of the above, having the combined teaching features of Perahia '688, Gardner '709 and Li '025, the phase shift between each set of training symbols as taught by Li #2 '621, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teaching features of Perahia '688, Gardner '709 and Li '025 by using a phase between set of training symbols in order to provide recovery of the transmitted training symbols at the receiver based on the phase shift.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hook et al (US 6,473,506 B1) and Sandhu et al (US 2005/0141407 A1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CANDAL ELPENORD whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 8:00AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Bin Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Candal Elpenord/
Examiner, Art Unit 2416

/Steven HD Nguyen/

Primary Examiner, Art Unit 2416